The International Journal of

APPLIED ENGINEERING EDUCATION

Volume Contents and Author Index for Volume 4, 1988

PERGAMON PRESS

OXFORD · NEW YORK · BEIJING · FRANKFURT
SÃO PAULO · SYDNEY · TOKYO · TORONTO

The International Journal of APPLIED ENGINEERING EDUCATION

EDITOR-IN-CHIEF

M. S. WALD, *Fachhochschule Hamburg, Berliner Tor* 21, 2000 *Hamburg* 1, *F.R.G.* (Tel. 040-2488-3014; Telex D217591; Fax. Hamburg 2713235)

EDITORIAL ADVISORY BOARD

J. W. Bauer, *Fraunhofer Institute for Food Processing and Packaging, Technical University of Munich, Schragenhofstrasse* 35, 8000 *München* 50, *F.R.G.*

B. Brouër, *Fachhochschule Hamburg, Fachbereich Maschinenbau und Chemieingenieurwesen, Berliner Tor* 21, 2000 *Hamburg* 1, *F.R.G.*

B. Chappey, *Directeur de l'Institut Universitaire de Technologie de Créteil, Avenue du Général de Gaulle,* 94010 *Créteil Cedex, France.*

S. R. Cheshier, *President, Southern College of Technology,* 1112 *Clay Street, Marietta, GA* 30060, *U.S.A.*

T. V. Duggan, *Dean, Faculty of Engineering, Portsmouth Polytechnic, Anglesea Building, Anglesea Road, Portsmouth PO*1 3*DJ, U.K.*

B. Eggers, *Institut für Angewandte Informatik, Technical University of Berlin, Franklinstrasse* 28/29, *D*-1000 *Berlin* 10, *F.R.G.*

M. G. Hartley, *Department of Electrical Engineering and Electronics, University of Manchester Institute of Science and Technology, Sackville Street, Manchester M*60 1*QD, U.K.*

G. Kardos, *Department of Mechanical and Aeronautical Engineering, C. J. Mackenzie Building, Carleton University, Ottawa, Canada K*1*S 5B*6.

J.-P. Krumme, *Information Systems Dept., Philips GmbH, Forschungslaboratorium Hamburg, Vogt-Kölln-Strasse* 30, 2000 *Hamburg* 54, *F.R.G.*

M. A. Larson, *Department of Chemical Engineering, Sweeney Hall, Iowa State University of Science and Technology, Ames, IA* 50011, *U.S.A.*

C. A. Maher, *Center for Mathematics, Science and Computer Education, The State University of New Jersey—Rutgers, New Brunswick, NJ* 08903, *U.S.A.*

G. W. McNelly, *Dean, School of Technology, Purdue University, W. Lafayette, IN* 47907, *U.S.A.*

K. L. McRoberts, *Department of Industrial Engineering,* 212 *Marston Hall, Iowa State University of Science and Technology, Ames, IA* 50011, *U.S.A.*

P. Meyer-Dohm, *Director of Education and Training, Volkswagen AG,* 3180 *Wolfsburg* 1, *F.R.G.*

J. Michel, *Ecole Nationale des Ponts et Chaussées,* 28 *rue Saint-Peres,* 75007 *Paris, France.*

B. Nag, *Director, Indian Institute of Technology, Powai, Bombay* 400076, *India.*

A. Petrenko, *CAD Department, Kiev Polytechnical Institute, Kiev*-56, *U.S.S.R.* 25056.

Z. J. Pudlowski, *School of Electrical Engineering, The University of Sydney, Sydney, N.S.W.* 2006, *Australia.*

L. D. Smullin, *Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, Cambridge, MA* 02139, *U.S.A.*

S. Waks, *Department of Education in Technology & Science, Technion, Israel Institute of Technology, Haifa* 32 000, *Israel.*

W. A. Woods, *Department of Mechanical Engineering, Queen Mary College, University of London, Mile End Road, London E*1*4NS, U.K.*

Xu Xin, *Education Department, Ministry of Machine Building Industry, Sanlihe Road, Beijing, P.R. China.*

K. Yamazaki, *Department of Production Systems Engineering, Toyohashi University of Technology, Tempaku-cho, Toyohashi* 440, *Japan.*

1989 Subscription Rates (Including Postage and Insurance)

Annual institutional subscription rate (1989) DM 290.00. Two-year institutional rate (1989/90) DM 551.00. Personal subscription rate for those whose library subscribes at the regular rate (1989) DM 93.00. Prices are subject to change without notice. Subscription enquiries from customers in North America should be sent to: Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523, U.S.A., and for the rest of the world to: Pergamon Press plc, Headington Hill Hall, Oxford OX3 0BW, U.K.

Back Issues

Back issues of all previously published volumes are available direct from Pergamon Press. Back issues of Pergamon journals in microform can be obtained from: UMI, 300 North Zeeb Road, Ann Arbor, MI 48106, U.S.A.

Copyright © 1989 *Pergamon Press plc*

Published 6 *per annum*

It is a condition of publication that manuscripts submitted to this journal have not been published and will not be simultaneously submitted or published elsewhere. By submitting a manuscript, the authors agree that the copyright for their article is transferred to the publisher if and when the article is accepted for publication. However, assignment of copyright is not required from authors who work for organizations which do not permit such assignment. The copyright covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microform or any other reproductions of similar nature and translations. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, electrostatic, magnetic tape, mechanical, photocopying, recording or otherwise, without permission in writing from the copyright holder.

Photocopying Information for Users in the U.S.A.

The Item-fee Code for this publication indicates that authorization to photocopy items for internal or personal use is granted by the copyright holder for libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service provided the stated fee for copying beyond that permitted by Section 107 or 108 of the United States Copyright Law, is paid. The appropriate remittance of $3.00 per copy per article is paid directly to the Copyright Clearance Center Inc., 27 Congress Street, Salem, MA 01970.

Permission for Other Use

The copyright owner's consent does not extend to copying for general distribution, for promotion, for creating new works, or for resale. Specific written permission must be obtained from the publisher for such copying.

The Item-fee Code for this publication is: 0742-0269/88 $3.00+0.00.

Volume Contents

NUMBER 1

M. S. Wald	1	Editorial
C. A. Maher	3	A perspective on applications of distance learning
A. B. Grubbs	11	Competencies for telecommunications professionals
G. S. Kohne and **F. X Spiegel**	17	The senior thesis design projects: an innovative approach combining traditional design with real-world communication experience
D. Muster and **F. Mistree**	23	The decision-support problem technique in engineering design
C. F. Newberry	35	The conceptual design of missiles
F. F. Ling	41	Mechanical engineering design course project: durian opener
B. G. Mobasseri	47	Integrating a microcomputer-based imaging workstation into the electrical engineering curriculum
J. N. Cannon, M. G. Rao, W. v. L. Campagne and **J. N. Fisher**	57	Teaching of process design at Howard University Report on an academic/industrial cooperation
R. A. Wadden and **P. A. Scheff**	71	Integrating design for control of occupational hazards into engineering education: development of a textbook.
J. S. Duggal and **C. Singh**	77	Reliability, availability and maintainability as factors in evaluation and operation of computer graphics systems
	i	Announcement
	I	Software Survey Section

NUMBER 2

M. S. Wald	83	Editorial
	85	Aerospace Issue Call for Papers
	87	Expert Systems and Engineering Education Issue Call for Papers
L. V. Brillhart, J. G. R. Hansen and **C. Fischer**	89	Instructional techniques used in U.S. mechanics education
G. A. Pugh	93	Computer simulation of planar fluid flow
A. Akers	97	Prospects of a fluid power engineering curriculum
L. Setian	103	An innovative approach to teaching engineering fields
D. L. Evans and **D. H. Bowers**	111	Conceptual design for engineering freshmen
R. A. Turnbull, P. Krishnan, M. R. Teel and **N. E. Collins**	123	Educational yield estimation subroutines (EYES): corn yield prediction
E.-G. Feindt	129	Stabilitätsdiagramm des Regelkreises, der aus einem Rechner mit PI-regelalgorithmus und einer Regelstrecke 1. Ordnung besteht
S. Marshall	141	A bridge between cultures: solving problems in engineering education in Papua New Guinea

F.-S. Liou	145	Microcomputer courses for construction students
R. L. Norton	151	Teaching cam design using the graphics microcomputer
	161	Announcement—World Conference on Engineering Education for advancing technology
	I	Software Survey Section

NUMBER 3

M. S. Wald	163	Editorial
W. E. Eder and **G. Kardos**	165	Editorial
W. E. Eder	167	Education for engineering design—application of design science
V. Hubka	185	A curriculum model—applying the theory of technical systems
R. D. de Pencier	193	A qualitative emphasis in undergraduate engineering design
S. Pugh	203	Total design, partial design a reconciliation
K. M. Wallace	207	Developments in design teaching in the Engineering Department at Cambridge University
A. E. Samuel and **W. P. Lewis**	211	Teaching less and learning more—a Socratic approach to engineering design education
W. Beitz	217	Teaching systematic design—procedures and experiences
C. A. Murfin and **P. J. Hicks**	221	Forward by design
C. Ledsome	227	An exploration of the limiting factors on incorporating design into engineering curricula
H. T. Harris	231	Advanced design methods—can and should the Universities teach them?
W. S. Venable	237	Developing a behavioral approach to teaching design
T. K. Hight, **L. Ginszauskas** and **D. MacLean**	243	Study of methods students use to solve ME design problems
G. Kardos	249	Engineering cases to add context to design exercises
M. M. Andreasen	255	WDK case studies
D. F. Radcliffe and **J. E. Holt**	259	Integrating applications software into design courses
C. O. Smith	265	Critical factors needing emphasis in design
G. Nadler and **J. G. Peterson**	275	Successful design in organizations: timeline scenarios
C. Hales and **K. M. Wallace**	289	Detailed analysis of an engineering design project
	295	Telecommunications in Science and Engineering Education Issue—Call for Papers
	296	Aerospace Issue—Call for Papers
	297	Expert Systems and Engineering Education Issue—Call for Papers
	298	Announcement: World Conference on Engineering Education for Advancing Technology, Sydney
	I	Software Survey Section

NUMBER 4

M. S. Wald	i	Editorial
	ii	Expert Systems and Engineering Education Issue—Call for papers
	iii	Telecommunications in Science and Engineering Education Issue—Call for papers
	iv	Aerospace Issue—Call for papers
Z. J. Pudlowski	301	Visual communication via drawings and diagrams
L. J. Genalo	317	Financing the enhancement of the computer environment
R. P. T. Tomkins and **I. Hundert**	321	The ChIME programs in chemical engineering for minority pre-college students
F. L. Bello-Ochende	325	Prediction of pressure effects on dissociation levels of combustion products in internal combustion engines
M. A. Reuter	331	Teaching process control to process engineering students using microcomputer simulations
R. I. Noorani and **F. G. Amy**	345	A microcomputer based stepper-motor control system
S. Malasri and **J. Budiman**	351	SOIL: An expert system educational software
K. S. Mortensen	355	Graduate manufacturing education
J. Abulawi	359	The determination of fatigue crack growth rates
R. Venkatachalam	365	An experimental determination of impulse
S. D. Haddad	371	The SAE radio controlled cargo aircraft competition
E. Mahajerin and **G. Burgess**	381	A simple derivation and computer implementation of the Fast Fourier Transform
	I	Software Survey Section

NUMBER 5

M. S. Wald	385	Editorial
J. A. Svoboda	387	On using the personal computer in teaching sophomore circuits
M. N. O. Sadiku	395	Computer plotting of electric field lines and equipotentials
J. Schmeelk	399	Generalized functions in digital processing
J. Ellis	403	An inexpensive experiment in mechanical CAD/CAM
C. R. Thomas	409	Computer usage and minimum learning curve computer software in engineering and technology
R. L. Norton	415	Teaching dynamics of machinery using the graphics microcomputer
W. P. Boyle	427	Mechanism kinetics: pseudographics and TK!SOLVER ™
B. M. Goodwin and **G. A. Melhem**	435	Solving complex kinetics problems with E.A.I.L.
E. Lumsdaine	449	Thermal resonance in solids
H. F. Kingsbury	457	Suggested architectural engineering accreditation guidelines—a look to the future
M. M. Ali	461	Impact of computers on architectural engineering research and education
K. A. Tubman	467	Students' appraisal of a combined engineering course
	I	Software Survey Section

NUMBER 6

M. S. Wald	471	Editorial
C. R. Haden and **D. L. Shunk**	473	Strategic planning for excellence by faculty and industry
A. K. M. Abdul Haq, F. A. Burney. I. H. Al-Madhoun and **S. Huq**	481	Evaluation of achievement of engineering students in engineering basics—a case study
B. Hyman	487	An education based approach to enhancing the public policy role of the engineering profession
J. Choma, Jr	499	The research role in university teaching environments
W. A. B. W. Abas, B. B. Ali and **R. S. Moorthy**	503	A university-industry partnership in running a postgraduate engineering course
P. B. U. Achi	507	Approaching tertiary curriculum design from industrial training perspective
G. Hankins	511	Expert systems and human learning
D. B. Gilmore	515	Methodology of education in entrepreneurial business management for mechanical engineers
F. L. Alvarado and **D. J. Ray**	519	Symbolically-assisted numeric computation in education
P. R. P. Hoole, F. Coowar and **S. Sinniah**	537	A software routine for symmetrical fault calculations for final year undergraduate students
D. W. Elizandro and **S. A. Starks**	547	Engineering design and computer-based laboratories
C. R. Maurer, Jr., G. E. Dean and **P. H. King**	551	The use of a personal computer in a biomedical instrumentation course
W. P. Boyle	557	The coffeee pot problem: an inviscid flow modelling exercise for undergraduate students
F. F. Ling	563	Water pumping system comprising windmill and rotating coil pump
K.-F. V. Wong and **D. Houston**	567	Software system design for surface water permitting
	I	Software Survey Section